porous material along an outer periphery of the porous material and the porous structures are formed of a materials selected from the group consisting of polyolefins, polyolefin copolymers and terpolymers, PTFE resin, thermoplastic perfluoropolymers, polyamides, polyimides, PVDF,polyethersulphones, polysulphones, polyarylsulphones, PVC, PET, polycarbonates, cellulose, cellulose esters, cellulose acetate, cellulose nitrate, polystyrenes, polyetherimides, acrylic polymers, methacrylic polymers, copolymers of acrylic or methacrylic polymers, epoxies, epoxy filled materials, polyurethanes and blends of any of the above.

Amend claim 22 as follows:

22) (Amended)The patterned structure of claim 2 wherein the porous structure is surfaced modified before the formation of the porous and [reduced porosity] non-porous areas.

Amend claim 23 as follows:

23)(Amended) The patterned structure of claim 2 wherein the porous structure is surfaced modified after the formation of the porous and [reduced porosity] non-porous areas.

REMARKS

This amendment is in response to the office action dated January 23, 2002 in the above identified application.

An extension of time in which to reply has been filed concurrently with this response.

Claims 1 and 8 were subject to a restriction requirement and as they were directed to the non-elected group of claims for examination in this application they are cancelled without prejudice. Applicants reserve the right to file a divisional application on these claims.

Affirmation of the election of Group II, claims 2-7 and 9-24 for examination in this case is made.

Claim 10 has been cancelled.

Claims 2, 3 and 21 have been rejected under 35 USC 102(b) over Yokoyama.(US 5,370,836). Applicant respectfully disagrees.

Yokoyama teaches partially compressing the fluoroplastic membrane to control the extent of porosity and thus the level of gas transfer across and through the membrane. The membrane is still however porous and would therefore allow some fluid to pass through the regions of partial porosity. The present invention claims fused, nonporous regions.

Claims 2-3, 9, 14-16 and 21 have been rejected under 35 USC 102(b) over FR 2 233 626. Applicant disagrees.

FR 2 233 626 is directed to a fibrous absorbent surface structure, in particular flocked fibrous absorbent surfaces. These fibers are bonded to a nonporous sheet and the sheet is then subdivided into separate pads having areas of these flocked fibers. The areas are subdivided by lanes formed between the pads. They are designed to prevent lateral flow from one pad to another. These structures also require an impermeable solid support, usually containing an adhesive.

In contrast, the present invention provides a porous filtration structure that is initially porous and then has various sections rendered non-porous, so that fluid may flow through the structure from one surface to other only in the porous regions. This is unlike the cited reference which cannot provide for the flow of fluid through its mass from one side to the other.

Claims 2-4, 9 and 14-21 have been rejected under 35 USC 102(b) over FR 2 633 398. Applicant disagrees.

FR 2 633 398 discloses a three layer structure with an additional temporary perforated plate, the entire assembly being used for biochemical analysis. A copy of the English translation of the text is enclosed for the examiner's use. The structure consists of a thin porous membrane on a closed cell foam layer which in turn is attached to a rigid support. The perforated plate is used to define wells on the surface of the membrane and is pressed onto the upper surface of the membrane to prevent liquid communication between adjacent wells.

It is evident from Figure 4 and the text that it is not the purpose of the pressing of the plate to create collapsed, non-porous areas in the membrane as that Figure shows the membrane is unchanged in crosssectional structure, merely deformed from the plane in which it originally lay. It is the use of the plate and the closed cell foam that creates somewhat isolated, temporary areas. No permanent non-porous areas are formed by the reference. The membrane not being rendered non-porous would still be capable of lateral flow but to a lesser extent. Additionally, due to the closed cell foam layer, no flow is capable from one surface of the membrane to the other as the foam would inhibit it.

Claims 2-4, and 21, 22 and 24 have been rejected under 35 USC 102(b) over WO 96/32635. Applicant respectfully disagrees.

Applicant contends that this reference is from non-analogous art and would not have been used by one of ordinary skill in the art of forming filtration membranes to make such membranes. The reference relates to the formation of electrodes and just happens to use a porous structure in doing so.

WO 96/32635 provides a method of defining an area on a layer, in this case, an electrode, by compressing a "porous substrate" upon which the layer resides. However, this structure is not non-porous, only of reduced porosity. Note Figure 2 and Page 7, lines 6-9 wherein the addition of a blocker, such as gelatine, is added to the collapsed region in order to make "the blockage of the pores 6 in the region 8 more complete so as to prevent the transportation of material across or through it." (Page 7, lines 7-9). This is confirmed by the examples in which those examples that do not use the combination of a blocker with sufficiently high compression exhibit leakage through the pores 6 of the compressed region 8. In Comparative Example 2, the use of gelatine without sufficient pressure allowed for leakage. In Comparative Examples 4 -6, sufficiently high compression with no blocker did not stop the leakage. There are no examples in which compression alone was shown to form a non-porous structure.

It is clear from the teachings of the reference that the combination of sufficient compression and a blocker is required in order to achieve a non-porous structure. This is not what is claimed by the present invention.

Claims 2-4, 9-12, 14-24 have been rejected under 35 USC 102(b) over EP 272 043. Applicant respectfully disagrees.

The reference teaches a composite membrane formed of three layers, at least two of which are "porous" or "very porous" (see Column 7, lines 11-15). This membrane is attached to a bottom of a preformed well. The composite membrane layers are a reaction layer, a sealing layer and a barrier layer. The cited reference is silent on any porous structure having non-porous areas formed in it as is required by the present invention. It does not teach or suggest rendering a portion of one layer non-porous so as to have a structure in one layer that has porous and non-porous regions in it.

The reference clearly states that the sealing layer is a porous material and that it relies instead on the liquophobicity of the material to form isolated porous areas (liquophobic being defined in the reference at Column 7, lines 18-21 as having "a critical surface energy lower than the surface tension of the applied liquid and not readily or spontaneously wetted by the applied liquid(s)").

Applicant wishes to point out that Column 8, lines 33 - 36 states that the barrier layer may be microporous or nonporous. However, even in the case when the barrier layer is non-porous, the entire layer is nonporous, not just a section of it.

Moreover, the wells are an integral part of the device. There is no disclosure to the effect that the composite membrane can exist independently of the wells as the membrane is only taught as being attached to the wells. Even it could exist independently, there is no patterned membrane as taught in the present invention.

Claims 2-6,9-12 and 14-21 are rejected under 35 USC 102(b) as being anticipated by Fernwood et al (US 4,493,815). US 4,493,815 uses a gasket with matching apertures to seal a membrane against an upper template and between an upper template and a matching lower template. It is the gasket that makes a liquid tight seal, not the membrane. In particular, the specification states that the gasket is made of a resilient inert material, the thickness of which I is not important. There is no teaching that the gasket forms a permanent non-porous area in the membrane. In fact, the use of a gasket clearly teaches to one of ordinary skill that a temporary seal is formed between the gasket and the membrane.

Claim 4 has been rejected under 35 USC 103(a) over FR 2 233 626. As the reference fails to teach or suggest the formation of areas of non-porous material in the membrane, it would not have been obvious from the reference to then form those areas into particular claimed shapes or configurations. The reference only teaches or suggestions using a rigid plate in combination with afoam layer to temporarily compress the membrane between them to form a temporary seal. There is no teaching or suggestion a fused, non-porous are being formed in the membrane structure.

Claims 5-7 have been rejected under 35 USC 103(a) over Yokoyama or FR 2 233 626 or EP 272043. It is stated that the prior art doesn't teach the number of porous wells that can be formed but that it would have been obvious to alter the number of wells. Applicant disagrees. First and foremost, the references as discussed above do not teach or suggest the present invention of forming areas of porous and non-porous portions in a membrane. Moreover, as admitted by the office action the number of areas of what is formed by the prior art is not taught. As such, the cited references each fail to teach or suggest the limitations of claims 5-7 which have specific numbers of areas and in some claims specific arrangements of these areas relative to each other all of which lead to unique structures.

Claim 7 has been rejected under 35 USC 103(a) over Fernwood for the same reason stated above in relation of claims 5-7. Applicant believes the same response applies to this rejection as for the one above and incorporates it by reference.

Claim 13 has been rejected under 35 USC 103(a) over EP 272043 or Fernwood. It is stated that the prior art is silent as to areas of porous and non-porous regions varying from layer to layer, but that the provision of adjustability where needed is not a patentable advance. This is not a matter of adjustability but rather the formation of unique, and until now, as admitted by the office action, unknown structures such as those shown in Figure 5-7 of the present application.

The above amendment is believed to respond fully and completely to all issues raised in the office action and place the claims in condition for allowance. The Examiner is invited to

call the Attorney of record at the phone number below if any further issues need to be addressed before allowance of the claims.

Attached are an amended and a clean copy of the amended claims.

Respectfully Submitted,

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May 23, 2002
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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to Assistant Commissioner of Patents, Washington D.C. 20231

On May 23 , 2002 Kimberly Atwood
Signature

Kimberly Atwood
Typed name of person signing

What is claimed:

1) (Cancelled) A process for forming a pattern of porous and reduced porosity areas on a porous structure comprising the steps of: selecting one or more layers of a porous structure, forming a pattern template having a solid matrix containing one or more openings, said one or more openings being arranged in the solid matrix to form the selected pattern for the areas of porous and reduced porosity, contacting the template to a selected surface of the porous structure and applying an energy selected from the group consisting of heat, pressure, softening and combinations thereof to the areas of the structure aligned with the solid matrix in the template in order to cause the porous structure beneath the solid matrix of the template to collapse and become fused into a reduced porosity mass.

2) (Amended) A patterned porous filtration structure comprising one or more layers of a porous structure having one or more areas of porous material and one or more areas of [reduced porosity or] non-porous material.

3) (Amended) The patterned structure of claim 2 wherein the one or more areas of porous material are more than one in number and are arranged in a manner so as to be separate and distinct from each other and separated from each other by a [reduced porosity or] non-porous structure.

4) The patterned structure of claim 2 wherein the one or more areas of porous material are of a shape selected from the group consisting of circles, ovals, polygons, lines, and mixtures thereof.

5) The patterned structure of claim 2 wherein the one or more porous areas are 96 in number and are equal in size.

6) The patterned structure of claim 2 wherein the one or more areas are at least 96 in number, equal in size and arranged in rows relative to each other in both the X and Y direction.

7) The patterned structure of claim 2 wherein the one or more areas are at least 384 in number.

8) (Cancelled) A process for forming a pattern of porous and reduced porosity or non-porous areas on a porous structure comprising the steps of: selecting a porous structure, forming a pattern template containing the selected pattern for the areas of porous and reduced porosity or non-porous areas, said template having a series of

openings which corresponding to the porous areas, contacting the template to a surface of the porous structure and applying a energy selected from the group consisting of heat, pressure, softening agents and combinations thereof to the areas of the structure not aligned with the openings in the template in order to cause the porous structure beneath the area of the template not aligned with the openings of the template to collapse and to become fused into a reduced porosity or non-porous mass.

9) The patterned structure of claim 2 wherein the porous structure is formed of two or more layers.

10) (Cancelled) The patterned structure of claim 2 wherein the porous structure is formed of two or more layers and each of the layers have one or more areas of porous material and one or more areas of reduced porosity material formed therein.

11) (Amended) The patterned structure of claim 2 wherein the porous structure is formed of two or more layers and each of the layers have one or more areas of porous material and one or more areas of [reduced porosity material formed therein and wherein the reduced porosity areas are] non-porous material.

12) (Amended) The patterned structure of claim 2 wherein the porous structure is formed of two or more layers and less than all of the layers have one or more areas of porous material and one or more areas of [reduced porosity] non-porous material formed therein and in register with each other.

13) (Amended) The patterned structure of claim 2 wherein the porous structure is formed of two or more layers and each of the layers have one or more areas of porous material and one or more areas of [reduced porosity] non-porous material formed therein and the areas of porous and [reduced porosity] non-porous material vary from layer to layer.

14) (Amended) The patterned structure of claim 2 wherein the porous structure is formed of two or more layers and at least one of the one or more layers have one or more areas of porous material and one or more areas of [reduced porosity] non-porous material formed therein.

15) (Amended) The patterned structure of claim 2 wherein the porous structure is formed of two or more layers, at least one of the layers has one or more areas of porous material and one or more areas of [reduced porosity] non-porous material

formed therein and wherein the two or more layers are selected from the group consisting of porous membranes, porous support materials and blends thereof.

16) (Amended) The patterned structure of claim 2 wherein the porous structure is formed of two or more layers, at least one of the layers has one or more areas of porous material and one or more areas of [reduced porosity] non-porous material formed therein and wherein at least one layer is a porous membrane and the remaining layer(s) are selected from the group consisting of porous membranes, porous support materials, [reduced porosity] or non-porous materials and blends thereof.

17)(Amended) The patterned structure of claim 2 wherein the porous structure is formed of two or more layers and each of the layers having formed therein one area of porous material surrounded by one area of [reduced porosity] non-porous material along an outer periphery of the porous material.

18) (Amended) The patterned structure of claim 2 wherein the porous structure is formed of two or more layers, each of the layers having formed therein one area of porous material surrounded by one area of [reduced porosity] non-porous material along an outer periphery of the of the porous material and the porous material being in a shape selected from the group consisting of circles, ovals, triangles, rectangles, squares and polygons.

19)(Amended) The patterned structure of claim 2 wherein the porous structure is formed of two or more layers of porous membranes and each of the layers having formed therein one area of porous material surrounded by one area of [reduced porosity] non-porous material along an outer periphery of the porous material [and wherein the reduced porosity material is non-porous].

20)(Amended)The patterned structure of claim 2 wherein the porous structure is formed of two or more layers of porous structures, each of the layers having formed therein one area of porous material surrounded by one area of [reduced porosity] non-porous material along an outer periphery of the porous material and the porous structures are formed of a materials selected from the group consisting of polyolefins, polyolefin copolymers and terpolymers, PTFE resin, thermoplastic perfluoropolymers, polyamides, polyimides, PVDF,polyethersulphones, polysulphones, polyarylsulphones, PVC, PET, polycarbonates, cellulose, cellulose esters, cellulose acetate, cellulose

nitrate, polystyrenes, polyetherimides, acrylic polymers, methacrylic polymers, copolymers of acrylic or methacrylic polymers, epoxies, epoxy filled materials, polyurethanes and blends of any of the above.

21)The patterned structure of claim 2 wherein the porous structure is formed selected from the group consisting of polyolefins, polyolefin copolymers and terpolymers ,PVDF, PTFE resin, thermoplastic perfluoropolymers, polyamides, polyimides, polyethersulphones, polysulphones, polyarylsulphones, PVC, PET, polycarbonates, cellulose, cellulose esters, cellulose acetate, cellulose nitrate, polystyrenes, polyetherimides, acrylic polymers, methacrylic polymers, copolymers of acrylic or methacrylic polymers, epoxies, epoxy filled materials, polyurethanes and blends of any of the above.

22) (Amended)The patterned structure of claim 2 wherein the porous structure is surfaced modified before the formation of the porous and [reduced porosity] non-porous areas.

23) (Amended) The patterned structure of claim 2 wherein the porous structure is surfaced modified after the formation of the porous and [reduced porosity] non-porous areas.

24) The patterned structure of claim 2 wherein the surface modification is selected from the group consisting of hydrophilic coatings, hydrophobic coatings, negatively charged coatings and positively charged coatings.

What is claimed:

2) (Amended) A patterned porous filtration structure comprising one or more layers of a porous structure having one or more areas of porous material and one or more areas of non-porous material.

3) (Amended) The patterned structure of claim 2 wherein the one or more areas of porous material are more than one in number and are arranged in a manner so as to be separate and distinct from each other and separated from each other by a non-porous structure.

4) The patterned structure of claim 2 wherein the one or more areas of porous material are of a shape selected from the group consisting of circles, ovals, polygons, lines, and mixtures thereof.

5) The patterned structure of claim 2 wherein the one or more porous areas are 96 in number and are equal in size.

6) The patterned structure of claim 2 wherein the one or more areas are at least 96 in number, equal in size and arranged in rows relative to each other in both the X and Y direction.

7) The patterned structure of claim 2 wherein the one or more areas are at least 384 in number.

9) The patterned structure of claim 2 wherein the porous structure is formed of two or more layers.

11) (Amended) The patterned structure of claim 2 wherein the porous structure is formed of two or more layers and each of the layers have one or more areas of porous material and one or more areas of non-porous material.

12) (Amended) The patterned structure of claim 2 wherein the porous structure is formed of two or more layers and less than all of the layers have one or more areas of porous material and one or more areas of non-porous material formed therein and in register with each other.

13) (Amended) The patterned structure of claim 2 wherein the porous structure is formed of two or more layers and each of the layers have one or more areas of porous material and one or more areas of non-porous material formed therein and the areas of porous and non-porous material vary from layer to layer.

14) (Amended) The patterned structure of claim 2 wherein the porous structure is formed of two or more layers and at least one of the one or more layers have one or more areas of porous material and one or more areas of non-porous material formed therein.

15) (Amended) The patterned structure of claim 2 wherein the porous structure is formed of two or more layers, at least one of the layers has one or more areas of porous material and one or more areas of non-porous material
formed therein and wherein the two or more layers are selected from the group consisting of porous membranes, porous support materials and blends thereof.

16) (Amended) The patterned structure of claim 2 wherein the porous structure is formed of two or more layers, at least one of the layers has one or more areas of porous material and one or more areas of non-porous material formed therein and wherein at least one layer is a porous membrane and the remaining layer(s) are selected from the group consisting of porous membranes, porous support materials, or non-porous materials and blends thereof.

17)(Amended) The patterned structure of claim 2 wherein the porous structure is formed of two or more layers and each of the layers having formed therein one area of porous material surrounded by one area of non-porous material along an outer periphery of the porous material.

18) (Amended) The patterned structure of claim 2 wherein the porous structure is formed of two or more layers, each of the layers having formed therein one area of porous material surrounded by one area of non-porous material along an outer periphery of the of the porous material and the porous material being in a shape selected from the group consisting of circles, ovals, triangles, rectangles, squares and polygons.

19)(Amended) The patterned structure of claim 2 wherein the porous structure is formed of two or more layers of porous membranes and each of the layers having formed therein one area of porous material surrounded by one area of non-porous material along an outer periphery of the porous material.

20)(Amended)The patterned structure of claim 2 wherein the porous structure is formed of two or more layers of porous structures, each of the layers having formed therein one area of porous material surrounded by one area of non-porous material

along an outer periphery of the porous material and the porous structures are formed of a materials selected from the group consisting of polyolefins, polyolefin copolymers and terpolymers, PTFE resin, thermoplastic perfluoropolymers, polyamides, polyimides, PVDF,polyethersulphones, polysulphones, polyarylsulphones, PVC, PET, polycarbonates, cellulose, cellulose esters, cellulose acetate, cellulose nitrate, polystyrenes, polyetherimides, acrylic polymers, methacrylic polymers, copolymers of acrylic or methacrylic polymers, epoxies, epoxy filled materials, polyurethanes and blends of any of the above.

21)The patterned structure of claim 2 wherein the porous structure is formed selected from the group consisting of polyolefins, polyolefin copolymers and terpolymers ,PVDF, PTFE resin, thermoplastic perfluoropolymers, polyamides, polyimides, polyethersulphones, polysulphones, polyarylsulphones, PVC, PET, polycarbonates, cellulose, cellulose esters, cellulose acetate, cellulose nitrate, polystyrenes, polyetherimides, acrylic polymers, methacrylic polymers, copolymers of acrylic or methacrylic polymers, epoxies, epoxy filled materials, polyurethanes and blends of any of the above.

22) (Amended)The patterned structure of claim 2 wherein the porous structure is surfaced modified before the formation of the porous and non-porous areas.

23) (Amended) The patterned structure of claim 2 wherein the porous structure is surfaced modified after the formation of the porous and non-porous areas.

24) The patterned structure of claim 2 wherein the surface modification is selected from the group consisting of hydrophilic coatings, hydrophobic coatings, negatively charged coatings and positively charged coatings.